

**Table 4.1-6.** Radiation doses to the public and associated latent cancer fatalities for the entire period of analysis (1998-2035).<sup>a</sup>

Fuel Group	Parameter	Technologies							
		1	2	3	4	5	6	7	8
		Prepare for direct co-disposal	Repackage and prepare to ship	Melt and dilute	Mechanical dilution	Vitrification technologies	Electrometallurgical treatment	Conventional processing	Continued wet storage
A. Uranium and Thorium Metal Fuels	MEI <sup>b</sup> dose (millirem)	0 <sup>c</sup>	NA	6.5×10 <sup>-5</sup>	NA	6.5×10 <sup>-5</sup>	6.5×10 <sup>-5</sup>	7.3×10 <sup>-5</sup>	0.01 <sup>g</sup>
	MEI LCF <sup>l,e</sup>	0 <sup>c</sup>	NA	3.2×10 <sup>-11</sup>	NA	3.2×10 <sup>-11</sup>	3.2×10 <sup>-11</sup>	3.6×10 <sup>-11</sup>	5.0×10 <sup>-6g</sup>
	Collective population dose (person-rem)	0 <sup>c</sup>	NA	2.4×10 <sup>-3</sup>	NA	2.4×10 <sup>-3</sup>	2.4×10 <sup>-3</sup>	1.6×10 <sup>-3</sup>	0.36 <sup>g</sup>
	Collective population LCF <sup>f</sup>	0 <sup>c</sup>	NA	1.2×10 <sup>-6</sup>	NA	1.2×10 <sup>-6</sup>	1.2×10 <sup>-6</sup>	8.1×10 <sup>-7</sup>	1.8×10 <sup>-4g</sup>
B. Materials Test Reactor-Like Fuels	MEI <sup>b</sup> dose (millirem)	0 <sup>c</sup>	NA	0.17	9.0×10 <sup>-5</sup>	0.17	0.17	0.54	0.46 <sup>g</sup>
	MEI LCF <sup>l,e</sup>	0 <sup>c</sup>	NA	8.5×10 <sup>-8</sup>	4.5×10 <sup>-9</sup>	8.5×10 <sup>-8</sup>	8.5×10 <sup>-8</sup>	2.7×10 <sup>-7</sup>	2.3×10 <sup>-4g</sup>
	Collective population dose (person-rem)	0 <sup>c</sup>	NA	6.3	0.3	6.3	6.3	7.3	16.7 <sup>g</sup>
	Collective population LCF <sup>f</sup>	0 <sup>c</sup>	NA	3.1×10 <sup>-3</sup>	1.7×10 <sup>-4</sup>	3.1×10 <sup>-3</sup>	3.1×10 <sup>-3</sup>	3.7×10 <sup>-3</sup>	8.3×10 <sup>-3g</sup>
C. HEU/LEU Oxides and Silicides Requiring Resizing or Special Packaging	MEI <sup>b</sup> dose (millirem)	0 <sup>c</sup>	NA	0.015	7.8×10 <sup>-4</sup>	0.015	0.015	0.12	0.12 <sup>g</sup>
	MEI LCF <sup>l,e</sup>	0 <sup>c</sup>	NA	7.3×10 <sup>-9</sup>	3.9×10 <sup>-10</sup>	7.3×10 <sup>-9</sup>	7.3×10 <sup>-9</sup>	6.2×10 <sup>-8</sup>	6.2×10 <sup>-5g</sup>
	Collective population dose (person-rem)	0 <sup>c</sup>	NA	0.54	0.029	0.54	0.54	1.3	4.5 <sup>g</sup>
	Collective population LCF <sup>f</sup>	0 <sup>c</sup>	NA	2.7×10 <sup>-4</sup>	1.4×10 <sup>-5</sup>	2.7×10 <sup>-4</sup>	2.7×10 <sup>-4</sup>	6.5×10 <sup>-4</sup>	2.2×10 <sup>-3g</sup>
D. Loose Uranium Oxide in Cans	MEI <sup>b</sup> dose (millirem)	NA	NA	6.1×10 <sup>-4</sup>	NA	6.1×10 <sup>-4</sup>	6.1×10 <sup>-4</sup>	7.1×10 <sup>-3</sup>	0.026 <sup>g</sup>
	MEI LCF <sup>l,e</sup>	NA	NA	3.0×10 <sup>-10</sup>	NA	3.0×10 <sup>-10</sup>	3.0×10 <sup>-10</sup>	3.6×10 <sup>-9</sup>	1.3×10 <sup>-5g</sup>
	Collective population dose (person-rem)	NA	NA	0.022	NA	0.022	0.022	0.075	0.95 <sup>g</sup>
	Collective population LCF <sup>f</sup>	NA	NA	1.1×10 <sup>-5</sup>	NA	1.1×10 <sup>-5</sup>	1.1×10 <sup>-5</sup>	3.8×10 <sup>-5</sup>	4.7×10 <sup>-4g</sup>
E. Higher Actinide Targets	MEI <sup>b</sup> dose (millirem)	NA	0 <sup>c</sup>	NA	NA	NA	NA	NA	3.7×10 <sup>-3g</sup>
	MEI LCF <sup>l,e</sup>	NA	0 <sup>c</sup>	NA	NA	NA	NA	NA	1.9×10 <sup>-6g</sup>
	Collective population dose (person-rem)	NA	0 <sup>c</sup>	NA	NA	NA	NA	NA	0.14 <sup>g</sup>
	Collective population LCF <sup>f</sup>	NA	0 <sup>c</sup>	NA	NA	NA	NA	NA	6.8×10 <sup>-5g</sup>
F. Non-Aluminum-Clad Fuels	MEI <sup>b</sup> dose (millirem)	NA	0 <sup>c</sup>	NA	NA	NA	NA	NA	NA
	MEI LCF <sup>l,e</sup>	NA	0 <sup>c</sup>	NA	NA	NA	NA	NA	NA
	Collective population dose (person-rem)	NA	0 <sup>c</sup>	NA	NA	NA	NA	NA	NA
	Collective population LCF <sup>f</sup>	NA	0 <sup>c</sup>	NA	NA	NA	NA	NA	NA

NA = Technology is not applicable to this fuel type.

HEU = Highly Enriched Uranium.

LEU = Low Enriched Uranium.

- Potentially reduced fuel receipts could reduce the reported impacts. Scaling factors applied to these impact values should be applied specifically to each fuel group affected. For example, if the amount of fuel in Group B were reduced to 80 percent of the value reported in Table 1-1, then each value reported for Group B should be multiplied by 0.8.
- MEI = Maximally Exposed Individual; i.e., a hypothetical member of the public whose location and habits result in exposure to the maximum dose from all pathways.
- No incremental increase expected above SRS baseline radioactive emissions values presented in Chapter 3 because these options would not affect the integrity of the fuel.
- LCF = latent cancer fatalities.
- For an individual, the LCF value should be interpreted statistically; e.g., 1×10<sup>-9</sup> = 1 chance in 1 billion to develop a fatal cancer.
- For collective population, the LCF value should be interpreted as the number of cancers that could be expected in the population.

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g. Reflects current reactor-area emissions (including two SNF wet basins) for the entire period of analysis.

**Table 4.1-7.** Number of radiation workers and collective worker radiation dose (person-rem) and associated latent cancer fatalities for the entire period of analysis (1998-2035).<sup>a</sup>

Fuel Group	Parameter	Technologies							
		1	2	3	4	5	6	7	8
		Prepare for direct co-disposal	Repackage and prepare to ship	Melt and dilute	Mechanical dilution	Vitrification technologies	Electrometallurgical treatment	Conventional processing	Continued wet storage
	Number of radiation workers <sup>b</sup>	75	38	100	88	159	119	150	40
A. Uranium and Thorium Metal Fuels	Collective worker dose (person-rem)	11	NA	12	NA	15	13	18	12
	LCF <sup>c</sup>	4.2×10 <sup>-3</sup>	NA	4.8×10 <sup>-3</sup>	NA	6.1×10 <sup>-3</sup>	5.2×10 <sup>-3</sup>	7.2×10 <sup>-3</sup>	4.9×10 <sup>-3</sup>
B. Materials Test Reactor-Like Fuels	Collective worker dose (person-rem)	480	NA	530	520	680	580	1,300	560
	LCF	0.19	NA	0.21	0.21	0.27	0.23	0.50	0.22
C. HEU/LEU Oxides and Silicides Requiring Resizing or Special Packaging	Collective worker dose (person-rem)	140	NA	150	150	190	160	600	150
	LCF	0.054	NA	0.059	0.059	0.075	0.064	0.24	0.060
D. Loose Uranium Oxide in Cans	Collective worker dose (person-rem)	NA	NA	31	NA	40	34	170	32
	LCF	NA	NA	0.012	NA	0.016	0.014	0.069	0.013
E. Higher Actinide Targets	Collective worker dose (person-rem)	NA	3	NA	NA	NA	NA	NA	5
	LCF	NA	1.3×10 <sup>-3</sup>	NA	NA	NA	NA	NA	1.8×10 <sup>-3</sup>
F. Non-Aluminum Clad Fuels	Collective worker dose (person-rem)	NA	26	NA	NA	NA	NA	NA	NA
	LCF	NA	0.011	NA	NA	NA	NA	NA	NA

NA = Technology is not applicable to this fuel type.  
 HEU = Highly Enriched Uranium.  
 LEU = Low Enriched Uranium.

- a. Potentially reduced fuel receipts could reduce the reported impacts. Scaling factors applied to these impact values should be applied specifically to each fuel group affected. For example, if the amount of fuel in Group B were reduced to 80 percent of the value reported in Table 1-1, then each value reported for Group B should be multiplied by 0.8.
- b. Estimates of the number of radiation workers are based on past operating experience (Bickford et al. 1997).

c. LCF = latent cancer fatalities.

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**Table 4.1-8.** Radiation doses to the maximally exposed noninvolved worker (at 640 meters) and associated latent cancer fatalities for the entire period of analysis (1998-2035).<sup>a</sup>

Fuel Group	Parameter	Technologies							
		1	2	3	4	5	6	7	8
		Prepare for direct co-disposal	Repackage and prepare to ship	Melt and dilute	Mechanical dilution	Vitrification technologies	Electrometallurgical treatment	Conventional processing	Continued wet storage
A. Uranium and Thorium Metal Fuels	Noninvolved worker dose (millirem)	0 <sup>c</sup>	NA	5.3×10 <sup>-4</sup>	NA	5.3×10 <sup>-4</sup>	5.3×10 <sup>-4</sup>	3.2×10 <sup>-4</sup>	0.068 <sup>d</sup>
	Noninvolved worker LCF <sup>b</sup>	0 <sup>c</sup>	NA	2.1×10 <sup>-10</sup>	NA	2.1×10 <sup>-10</sup>	2.1×10 <sup>-10</sup>	1.3×10 <sup>-10</sup>	2.7×10 <sup>-5d</sup>
B. Materials Test Reactor-Like Fuels	Noninvolved worker dose (millirem)	0 <sup>c</sup>	NA	1.4	0.074	1.4	1.4	1.3	3.1 <sup>d</sup>
	Noninvolved worker LCF <sup>b</sup>	0 <sup>c</sup>	NA	5.6×10 <sup>-7</sup>	2.9×10 <sup>-8</sup>	5.6×10 <sup>-7</sup>	5.6×10 <sup>-7</sup>	5.4×10 <sup>-7</sup>	1.3×10 <sup>-3d</sup>
C. HEU/LEU Oxides and Silicides Requiring Resizing or Special Packaging	Noninvolved worker dose (millirem)	0 <sup>c</sup>	NA	0.12	6.3×10 <sup>-3</sup>	0.12	0.12	0.22	0.84 <sup>d</sup>
	Noninvolved worker LCF <sup>b</sup>	0 <sup>c</sup>	NA	4.8×10 <sup>-8</sup>	2.5×10 <sup>-9</sup>	4.8×10 <sup>-8</sup>	4.8×10 <sup>-8</sup>	8.6×10 <sup>-8</sup>	3.4×10 <sup>-4d</sup>
D. Loose Uranium Oxide in Cans	Noninvolved worker dose (millirem)	NA	NA	5.0×10 <sup>-3</sup>	NA	5.0×10 <sup>-3</sup>	5.0×10 <sup>-3</sup>	0.013	0.18 <sup>d</sup>
	Noninvolved worker LCF <sup>b</sup>	NA	NA	2.0×10 <sup>-9</sup>	NA	2.0×10 <sup>-9</sup>	2.0×10 <sup>-9</sup>	5.0×10 <sup>-9</sup>	7.1×10 <sup>-5d</sup>
E. Higher Actinide Targets	Noninvolved worker dose (millirem)	NA	0 <sup>c</sup>	NA	NA	NA	NA	NA	0.025 <sup>d</sup>
	Noninvolved worker LCF <sup>b</sup>	NA	0 <sup>c</sup>	NA	NA	NA	NA	NA	1.0×10 <sup>-5d</sup>
F. Non-Aluminum-Clad Fuels	Noninvolved worker dose (millirem)	NA	0 <sup>c</sup>	NA	NA	NA	NA	NA	NA
	Noninvolved worker LCF <sup>b</sup>	NA	0 <sup>c</sup>	NA	NA	NA	NA	NA	NA

NA = Technology is not applicable to this fuel type.

HEU = Highly Enriched Uranium.

LEU = Low Enriched Uranium.

- Potentially reduced fuel receipts could reduce the reported impacts. Scaling factors applied to these impact values should be applied specifically to each fuel group affected. For example, if the amount of fuel in Group B were reduced to 80 percent of the value reported in Table 1-1, then each value reported for Group B should be multiplied by 0.8.
- LCF = latent cancer fatalities; this number should be interpreted statistically.
- No incremental increase expected above SRS baseline radioactive emissions values presented in Chapter 3, because these options would not affect the integrity of the fuel.
- Reflects current reactor-area emissions (including two SNF wet basins) for the entire period of analysis.